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TECHNICAL REVIEW AND EVALUATION AIR QUALITY PERMIT NO. 38400 *BHP Copper Inc. – Pinto Valley Operations*

I. INTRODUCTION

This is a renewal synthetic minor permit for existing permit no. 1000650 issued to BHP Copper Inc. for mining and milling operations located at Pinto Valley, near Miami, Arizona. The operation consists of open-pit mining, crushing and screening operations, production of copper concentrate; heap leaching, and solution extraction/electrowinning (SX/EW) plant to produce copper.

A. Company Information

Facility Name: BHP Copper Inc. - Pinto Valley Operation

Mailing Address: P.O. Box 100
Miami, AZ 85539

Facility Address: 8 miles west of Miami, off U.S. Highway 60
Pinto Valley, Gila County, Arizona

B. Attainment Classification

BHP Pinto Valley is currently located in a non-attainment area for sulfur dioxide and PM₁₀.

C. Background Information

BHP Pinto Valley was issued a Title V Permit No. 1000656 which expired on May 30, 2006. The facility had suspended mining operations for the last 8 years for economic reasons. However, the facility continued Solvent Extraction/Electrowinning (SX/EW) operations during this time. Also, the facility continued to maintain all the facility equipment in “care and maintenance” mode. The facility made an application for renewal of title V permit on November 30, 2005. The facility later decided to voluntarily accept emission limitations and controls to remain below 100 tons/year threshold and, thus, decided to convert the application to a synthetic minor permit application. The revised application was filed on June 22, 2006. The facility has also proposes to install a filtration plant for the concentrate at this site. Earlier, the concentrate used to be pumped 8 miles to an off-site facility at Miami.

II. PROCESS DESCRIPTION

The mining operation is carried out in four phases: drilling, blasting, loading and hauling. During this process, material is classified as being ore or leachable waste. Ore grade material is transported to the primary crushing facility for further processing in the concentrator operations. Leachable waste is transported to dumps where the copper content is leached and the pregnant solution is further processed at the SX/EW facilities.

Primary Crushing Plant - Haul trucks dump the ore directly into the primary crusher, which reduces the large rocks to approximately 8 inches in size. The crushed ore is then taken from the bin below the crusher by conveyor to the coarse ore storage pile, which has a storage capacity of 33,000 tons. The coarse ore travels by conveyor to the fine crushing plant where it is reduced

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from about eight inches to less than one-half inch. This fine ore is then carried by conveyor to the fine ore bins.

Grinding and Flotation - The fine ore is fed by conveyors into six ball mills loaded with three and a half inch round steel balls, water, and reagents in order to grind it to a size which will “free” the copper and molybdenum (moly) bearing minerals from the “gangue” (valueless rock). The next step, flotation, is divided into approximately three equal parts consisting of a rougher cell and a cleaner cell section. In flotation, agitators are located in rows of long open-topped tanks. These agitators draw air into the slurry to make a froth, which picks up the copper particles and floats them away from the unwanted gangue. The slurried gangue passes through the tanks and is referred to as tailings.

A “rough” float is made in the flotation process, thus the name roughers. Then two more cleaning floats are made to produce a concentrate, which is about 30% copper. Another grinding step called regrinding is required between the rougher and cleaner floats to free the copper minerals for final upgrading.

Copper Thickeners - The copper concentrate flows into two large diameter tanks called thickeners. The purpose of the thickeners is to allow the solids to settle to the bottom and be drawn out as slurry while clear water is recovered.

Copper Concentrate – The final copper concentrate is thickened again in another thickener and then pumped to a horizontal pressure filter in the filter plant. Most of the water is separated from the copper concentrate in the filter plant. The concentrate, containing about 8-10% moisture, is transported by conveyors and stored in an enclosed concentrate storage building. This concentrate is, then, hauled by trucks to a smelter where it is processed into copper metal.

Tailings - Tailings from the copper flotation circuit flow by gravity to three large, 350-foot diameter thickeners. The underflow (thickened slurry) from these thickeners flows down a large pipeline to the tailings dam. The overflow or clear water is pumped back to the grinding circuit.

At the tailings dam, cyclone classifiers are used to separate coarse sand, which falls in piles to make a dam. Fine slimes flow to the back of the dam area. A pond of water is also formed at the rear of the dam, and the water is pumped back to tanks for recycle into the grinding circuit.

Solvent Extraction – Electrowinning (SX/EW) Operations

The SX/EW plant is designed to recover acid soluble copper from leach solutions. Copper laden or pregnant leach solution (PLS) is collected below the mine leach dumps at the Gold Gulch No. 1 PLS pond. The PLS is pumped through an 18-inch diameter pipeline from Gold Gulch No. 1 to the SX-EW plant one mile away.

The solvent extraction portion of the process consists of a train of mixer-settlers, some of which are extractor cells and some of which are stripper cells. In the extractor cells, copper is removed from the PLS by mixing it with a kerosene diluent containing the organic extraction reagent. The blended organic loaded with copper is separated from the aqueous portion of the PLS by gravity with the barren aqueous portion, now referred to as raffinate, returning to the leach dumps and the copper-laden blended organic moving to the stripper cells.

In the stripper cells, copper is stripped from the loaded organic by mixing with barren or “lean” aqueous electrolyte from the electrowinning process. The high acid content of the barren electrolyte causes the stripping action. In the stripper cells the now copper-laden, or pregnant electrolyte, is routed to the electrowinning process in the “tank house” while the barren organic is

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returned to the extractor cells for reuse.

During the electrowinning process, electrical current is passed through the pregnant electrolyte in the tank house cells. Within the cells the pure copper is plated onto cathodes as the copper gains electrons from the current.

III. EMISSIONS

The facility will have uncontrolled particulate matter (PM) emissions, particulate matter less than 10 microns in diameter (PM₁₀) emissions, and nitrogen oxide (NO_x) above the significant levels as identified in Arizona Administrative Code (A.A.C.) R18-2-101.106.a. Thus, a Class II permit is required for the source according to A.A.C. R18-2-302.B.2.a.iii. The facility has voluntarily accepted to have emission limitations and air pollution controls for particulate matter less than 10 microns in diameter (PM₁₀) emissions, and 500 hours limitations on operation of standby diesel generators to remain below major source threshold.

Table-1 below provides the summary of emissions from various sources as well as facility wide potential-to-emit (PTE).

Table-1

Pollutant	Crushing and Milling operations tpy	Moly Conc. Drying tpy	Filtration Plant (New) tpy	Boilers tpy	SX/EW unit tpy	IC Engines (for 500 hr) tpy	Facility wide tpy
PM ₁₀	75.98	10.51	0.04	0.12		0.38	87.03
CO				0.30		1.15	1.45
NO _x				1.20		5.32	6.52
SO ₂				6.84		0.35	7.19
Benzene					0.11		0.11
Toluene					1.63		1.63
Ethylbenzene					6.46		6.46
Xylenes					8.93		8.93
1,2,4 trimethylbenzene					1.76		1.76
1,3,5 trimethylbenzene					1.76		1.76
VOCs					31.19	0.42	31.61
H ₂ SO ₄ mist					14.75		14.75

IV. COMPLIANCE HISTORY

Thirty-five air quality inspections were carried out between the years 1993 through 2005. The facility was not issued any Notice of Violation (NOV) or Notice of Correction (NOC) as a result of these. BHP Copper Pinto Valley facility appears to be in compliance with no outstanding compliance or enforcement issues.

V. APPLICABLE REGULATIONS

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Table 2 identifies the applicable regulations corresponding to every process unit and also provides verification as to why that standard applies.

Table 2: Verification of Applicable Regulations

Unit	Control Device	Rule	Verification
Crushing, screening and material transfer operations, concentrator, moly dryer	Wet Scrubbers, water spray	A.A.C. R18-2-721 A.A.C. R18-2-702 Arizona SIP R9-3-521	A.A.C. R18-2-721 is applicable to all metallic mining operations.
Boilers/Moly. Dryer	N/A	A.A.C. R18-2-724	This standard is applicable to all fossil fuel fired equipment.
Diesel generators	N/A	A.A.C. R18-2-719	This standard is applicable to all internal combustion engines. and SO ₂ , respectively.
Electrowinning/ Solvent extraction operations, miscellaneous storage tanks, concentrate filtration plant, and lime crushing plant	N/A	A.A.C. R18-2-730	This standard is applicable to unclassified sources.
Fugitive dust	Water and other reasonable precautions	Article 6, A.A.C. R18-2-702	These are applicable to any fugitive dust source.
Mobile sources	Water Sprays/Water Truck for dust control	Article 8	This Article is applicable to off-road mobile sources, which either move while emitting air pollutants or are frequently moved during the course of their utilization.
Spray painting operations	N/A	A.A.C. R-18-2-727, SIP R9-3-527.C	This standard is applicable to any spray painting operation.
Demolition/renovation operations	N/A	A.A.C. R18-2-1101.A.8	This standard is applicable to any asbestos related demolition or renovation operations.

VI. PREVIOUS PERMIT CONDITIONS

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Table 3 compares the conditions in Permit No. 1000656 with the conditions in this permit and cross-references the previous permit conditions to their location in the new permit.

Table-3

Condition # in permit nos. 1000650	Determination				Comments
	Delete	Kept	Revise	Streamline	
Attachment A			x		Most recent attachment is used for this permit.
Attachment B					
Conditions I.A, B		x			This Condition for certified EPA Method 9 observer is renumbered as I.A.1
Condition I.C		x			This reporting requirement is renumbered as I.B.2.
Conditions I.A.1, 2		x			These conditions for emission standards and limitations are renumbered as II.A.1.a and b.
Condition II.A.3			x		This condition for Opacity standard is revised from 40% to 20% as per rule 702.B, and is relocated as II.B.1.a.
Condition II.B.1, 2		x			This Condition have been relocated as Condition II.A.2.a and c.
Condition II.C.1, 2		x			These monitoring, record keeping, and reporting requirements are renumbered as II.A.4.a and b.
Condition II.C.3		x			This Condition for monitoring, record keeping, and reporting requirements for opacity is renumbered as II.B.2.
Condition II.C.4		x			This monitoring requirement for fugitive emissions is relocated as Condition VI.C
Condition II.D.1			x		This particulate matter performance-testing requirement for wet scrubbers has been revised and new Condition II.A.3 requires testing to meet the standards specified. Also, performance-testing frequency has been changed to annual instead of once in permit term.
Condition II.D.2		x			This annual performance testing requirement for opacity has been relocated as II.B.3
Condition III.A			x		This fuel limitation for boilers now permits only diesel fuel and is relocated as Condition IV.B.1.

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Condition III.B.1		x			This Condition for opacity standard has been relocated as Condition IV.C.1.c
Condition III.B.2		x			This monitoring requirement for opacity from boilers stacks has been relocated as Condition IV.C.2.
Condition III.C		x			The particulate matter emission requirements for boiler have been relocated as Condition IV.C.1.
Condition III.D		x			This condition for SO ₂ emissions from boilers has been relocated as Condition IV.D.
Condition IV.A		x			This Condition for VOC emissions from SX/EW plant and storage tanks has been relocated as Condition III.C.
Section V		x			This Section for fugitive emission from non-point sources has been relocated as Section VI.
Section VI		x			This section for mobile sources requirements has been relocated as Section VII.
Section VIII		x			This Section for other periodic activities requirements has been relocated as section VIII.

VII. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS

A. Metallic Mineral Processing

1. Opacity and Particulate Matter

a. Visible emissions from process sources

The Permittee is required to establish a baseline opacity level for all the point sources in the facility when all the equipment and air pollution control devices are in good working order. This baseline level shall be regarded as an indirect indicator of the particulate emissions from the facility. Permittee is required to conduct a bi-weekly (every other week) survey of all the point sources in the facility. If the results from the visible survey exceed the baseline levels (or the 20% opacity standard), the Permittee shall make a Method 9 measurement. If this Method 9 reading is in excess of the baseline level but less than the 20% opacity standard, Permittee shall take corrective action to bring down the emissions to an acceptable level. If the Method 9 reading is in excess of both the baseline level and the 20% opacity standard, the Permittee shall take suitable corrective action and report it as an “excess emission” for opacity.

b. Fugitive emissions

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The Permittee is required to conduct a bi-weekly (every other week) visual survey of the fugitive emissions from in the facility. If any observation appears to exceed the opacity standard, the Permittee shall conduct and record a proper Method 9 observation. If this observation is in excess of the opacity standard, suitable corrective action shall be taken and also reported to ADEQ as an “excess emission”.

2. Material Handling

The Permittee is also required to keep records of daily process rates and hours of operation.

B. Boilers/IC engines

1. The Permittee shall be required to contain monthly surveys of visible emissions from the boiler and IC engines stacks. If any observation appears to exceed the opacity standard, Permittee shall conduct and record a proper Method 9 observation. If this observation is in excess of the opacity standard, suitable corrective action shall be taken and also reported to the agency as an “excess emission”.
2. This being a synthetic minor permit, the Permittee is required to maintain records of monthly operating hours and rolling 12-month total for the standby diesel generators.
3. The Permittee is required to maintain records fuel supplier certification document showing the name of the fuel supplier, the typical heating value of the fuel, and the maximum sulfur content to demonstrate compliance.

VIII. TESTING REQUIREMENTS

- A. The permit specifies emission limits from various process sources to maintain synthetic minor status. The Permittee is required to conduct perform testing, using EPA reference Method 201A and Method 202, on various scrubbers and the moly dryer stack within 180 days of issuance of permit. Thereafter, the Permittee is required to conduct annual perform testing for all scrubbers and the moly dryer stack to ensure compliance with PM₁₀ emission standards.
- B. The Permittee is required be required to perform a quarterly opacity test on all the wet scrubbers in the facility in addition to the bi-weekly (every other week) visual survey.

IX. LIST OF ABBREVIATIONS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
AQD	Air Quality Division
CO	Carbon Monoxide
HAP	Hazardous Air Pollutant
hp	Horsepower

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hr	Hour
IC	Internal Combustion
lb	Pound
m	Meter
MMBtu.....	Million British Thermal Units
NAAQS.....	National Ambient Air Quality Standard
NO _x	Nitrogen Oxide
PM.....	Particulate Matter
PM ₁₀	Particulate Matter Nominally less than 10 Micrometers
PTE	Potential-to-Emit
SO ₂	Sulfur Dioxide
TPY	Tons per Year
VOC	Volatile Organic Compound
Yr.....	Year